INDUSTRIAL EXPERIENCE

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ELECTROEROSION TRUEING OF SYNTHETIC DIAMOND WHEELS

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Conversion of electroerosion trueing of synthetic diamond wheels substantially reduces grinding bar consumption and increases labor productivity.

Wheels are known to lose cuttability both due to diamond grain wear and glazing of the working surface. To reduce the cost of wheel recovery, a procedure of electroerosion trueing is successfully converted at the Neman Glass Works.

The essence of the electroerosion procedure consists in the fracture of the surface layers of the wheel under the effect of electric discharges and concurrent high temperature. The desired effect is attained using a pulse generator capable of converting the single-phase power current into a unipolar pulse current of controlled amplitude and frequency of pulses.

Characteristics of the generator

System voltage, V	220 ± 10%
System frequency, Hz	50 ± 10%
Rated current, A	35
Spot frequency of pulses, kHz	1, 3, 8
On-off time ratio	1.2, 2
Power consumption, kV · A	1.1 ± 10%
Mass, kg	20

A single generator is capable of providing electroerosion trueing of the wheels on 10 – 15 machines simultaneously. The process performance is as follows: frequency 1 kHz and on-off time ratio 1.2.

Trueing is performed directly on SAG machines at a standard rotation rate and consumption of cooling water. The duration of single trueing of one side of the A2P wheel cutting edge is 10 – 15 sec, the periodicity being 30 – 45 min. Rapid elimination of the binder and opening of new diamond grains is thus observed along with the fracture of the hydrosilicate film formed on the wheel surface due to adhesion of fine particles of polished glass.

The working electrode consists of three E-type steel plates measuring 75 × 30 × 3 mm placed 3 mm from each other in the working region. The plates are mounted on a vinyplast holder measuring 250 × 30 × 10 mm. The working electrode is connected to the negative pole of the pulse generator, the diamond wheel being the second electrode (anode).

Excitation of the arc proceeds when the working electrode contacts the wheel. The current density measured along the contact lines is rather high, which results in the instant pitting of the surface layers under the effect of the arc heat. Setting erosion products are periodically removed from the interplate space.

Moreover, electroerosion appeared effective in recovering of the profile topography and in elimination of the wheel runout resulting from the nonuniform wear of the working surface (or for any other reason). The procedure is performed on a 3V642 grinding machine. The diamond wheel (anode)

TABLE 1

Parameters of A2P wheel*	Grain	Run out of the working surface, μm		Trueing duration, min**	
		right	left	right	left
250 × 12 × 110°	100/80	80	120	4.42	4.80
250 × 12 × 110°	100/80	150	180	8.17	12.25
250 × 8 × 110°	63/50	110	50	4.88	1.80
250 × 8 × 110°	63/50	30	80	1.22	3.08
150 × 6 × 90°	50/40	40	90	1.68	3.13
150 × 6 × 90°	50/40	150	130	4.22	2.77

* 100% diamond concentration.

** Run-out of the working surface after trueing ranges from 10 to 30 μm.

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in the special adapter is fixed at the swivel work head spindle and the electrode (cathode) is fixed at the clamp of the work mount which can move in a longitudinal/transverse direction, thus providing the possibility of precise advance of the electrodes. The frequency of wheel rotation is 2240 rpm. Several parameters of the process are listed in Table 1.

Service-related 125-mm and 88-mm dulling of the cutting edge observed for A2P 250 × 8 and A2P 150 × 6 wheels, respectively, was successfully eliminated upon trueing. Cathode endurance after elimination of glazing attains 6 months.

Conversion of electroerosion trueing technology at the "NEMAN" Glass Works makes it possible to reduce the consumption of carbo- and electrocorundum grinding bars and to increase the labor productivity due to shortening of the trueing procedure and formation of a developed cutting relief of the wheel working surface.